California Energy Commission 2005 Energy Report Committee Third Workshop on the Water-Energy Relationship Staff Paper

June 21, 2005

Study Purpose

For the Energy Commission Portion:

- To Accurately Assess Energy Demand in Water Sector
- To Explore Potential to Reduce On-Peak and Total Electric Demand through Water System Conservation, Efficiency and Electric Generation
- To Develop Tools and Programs for Planners, Water Agencies and Companies to Address Energy Needs of New and Existing Systems

Water Energy Relationship Questions

Are the energy requirements for water storage, statewide or regional conveyance, supply treatment, local delivery, primary end-use, and wastewater treatment and disposal adequately described? If not, what is missing?

Present Demand in Water Sector?

Water Supply Includes all pumping for conveyance and distribution	*11,953 GWh*
Treatment Includes treatment to potable standards, sewage and watewater treatment, and disposal	*1,388 GWh*
End-Use	*12,482 GWh*
Irrigation Pumping	*2,269 GWh*

DATE: *6/05*
SOURCE: *California Energy Commission*

Disparity in Ag Estimates

- Others' Estimates of Ag Energy Use as Much as Four Times Higher than CEC's Estimate
- Some Difference Accounted for in Other Categories (see DAO Chart)
- CEC's Estimate Likely Underestimates Groundwater Pumping
- Ag Water Use Trends Shift Unpredictably Due to Changes in Crops

Ag Sector Energy Use Patterns

- Though Ag Energy Demand May be Low, Peak Power Demand May be High
- Ag Sector Pumping Limited to 6 Months Per Year, and Most Intensive in June-August
- Accounts for As Much as 4,500 MW On-Peak in Peak Months
- Limited Ability to Shift Off-Peak Because of Irrigation System Limitations

Ag Sector Net Effect

- Will Ag Sector Energy Efficiency and Land Idling Programs Offset Crop Pattern Changes?
- Will Push Towards Drip Irrigation Continue, and Will It Cause Increase in Groundwater Pumping?
- Will Electrification Significantly Increase Ag Sector Energy and Power Demand?

Water Energy Relationship Questions

Does the report properly portray the context of how California's water development, treatment, and use will change in the future and how these changes might affect energy demand?

Potential Water Sector Electricity Demand Increases by 2015

Cause	Increase
More Stringent Treatment	At least 1,400 GWh
Water Market Transactions	Perhaps 2,000 GWh
Conjunctive Use Pumping	1,300 MW, and 3,450 GWh
Increased Drip Irrigation	Perhaps 1,900 GWh
Recycled Water System Development	Easily 6,000 GWh
Desalination Facility Development	About 2,150 GWh
Total	**16,900 GWh**

DATE: *6/05*
SOURCE: *California Energy Commission*

Typical Energy Use In Water & Wastewater Treatment

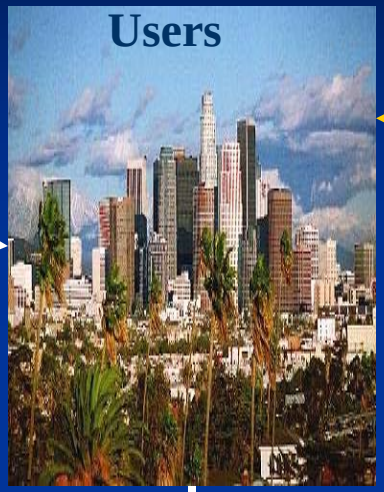
Start Lake

1. Pumps to Plant
=100kWh/MG

2. Water Treatment Plant
= 250kWh/MG

3. Pumps to Distribution System
= 1150kWh/MG

Users



4. Pumps to Plant
= 150kWh/MG

6. Recycled Water Pumping
= ? kWh/MG

5. Wastewater Treatment Plant
= 1050kWh/MG

End River

	Step 1	Step 2	Step 3	Step 4	Step 5
Accumulating Total	100kWh/MG	350kWh/MG	1500kWh/MG	1650kWh/MG	2700kWh/MG

Source: EPRI 1998

Urban Water Agency Energy Use by Sector
(kWh/MG)

Conveyance:	0 - 10,000 kWh/MG
Treatment:	100 - 5,000 kWh/MG
Distribution:	0 - 1,200 kWh/MG
Wastewater pumping:	0 - 400 kWh/MG
Wastewater treatment:	1,000 - 3,500 kWh/MG
Total:	**1,100 - 20,100 kWh/MG**

DATE: *6/05*
SOURCE: *California Energy Commission*

Water Sector Energy Use
Regional Use (kWh/MG)

	(SoCal)	(NorCal)
Water Supply	5,757	454
Distribution	672	686
Wastewater	2,001	2,001
Total	8,430	3,141

Water Energy Relationship Questions

What actions can be taken to improve the effectiveness of existing water and energy sector programs, such as conservation, efficiency and forecasting programs, as well as to assist water management agencies to use energy more efficiently or aid in fostering more efficient and effective use of California's water resources?

Water Sector Energy Use

For West Basin MWD (kWh/MG)

- Imported Water
  - SWP 9,000
  - Colorado River 6,000
- Groundwater
  - Replenished with Recycled Water 1,500
  - Replenished with SWP Water 10,500
  - Replenished with CR Water 7,500

Recycled Water 1,500 – 3,900

SW Desalination (estimated) 13,400

Potential Solutions to Potential Shortage

- Water Conservation
  - Careful Planning Required, as Some Water Conservation Programs Increase Energy Use
- Water System Peak Load Reduction (TOU Rates, Storage/Pump Management)
- Market Transactions to Reduce Long-Distance Pumping (Exchanges, etc.)
- Water System Generation

Questions?
More Information?

For all Questions or Requests for More Information Concerning the Water-Energy Relationship Staff Paper, Please Contact:

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